Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Use of Spectrum Bands Above 24 GHz for Mobile Radio Services	)	GN Docket No. 14-177
	)	
Establishing a More Flexible Framework to Facilitate Satellite Operations in the 27.5-28.35 GHz and 37.5-40 GHz Bands	)	IB Docket No. 15-256
	)	
Petition for Rulemaking of the Fixed Wireless Communications Coalition to Create Service Rules for the 42-43.5 GHz Band	)	RM-11664
	)	
Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95 and 101 to Establish Uniform License Renewal, Discontinuance of Operations, and Geographic Partitioning and Spectrum Disaggregation Rules and Policies for Certain Wireless Radio Services	)	WT Docket No. 10-112
	)	
Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz and 48.2-50.2 GHz Frequency Bands; Allocation of Spectrum to Upgrade Fixed and Mobile Allocations in the 40.5-42.5 GHz Frequency Band; Allocation of Spectrum in the 46.9-47.0 GHz Frequency Band for Wireless Services; and Allocation of Spectrum in the 37.0-38.0 GHz and 40.0-40.5 GHz for Government Operations	)	IB Docket No. 97-95

REPLY COMMENTS OF SPRINT CORPORATION

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REPLY COMMENTS OF SPRINT CORPORATION

I. INTRODUCTION AND SUMMARY

Sprint Corporation ("Sprint") hereby replies to comments filed in response to the Further Notice of Proposed Rulemaking[1] issued by the Federal Communications Commission

[1] *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services; Establishing a More Flexible Framework to Facilitate Satellite Operations in the 27.5-28.35 GHz and 37.5-40 GHz Bands; Petition for Rulemaking of the Fixed Wireless Communications Coalition to Create*

("Commission" or "FCC") in the above-captioned proceedings. Sprint supports flexible rules and policies that promote the development of new 5G mobile services in millimeter wave ("mmW") spectrum, and it appreciates the Commission's expeditious action in this rulemaking. As proposed in the *FNPRM*, the Commission should extend this flexible approach to additional mmW bands.

At the same time, the Commission must protect and permit the further expansion of fixed wireless backhaul operations in the mmW bands, especially given prior investment in these systems and carriers' growing need for wireless backhaul capacity. Like numerous commenters, Sprint also believes that the Commission should leave in place the existing, non-exclusive licensing rules in the 70/80 GHz bands rather than adopt its proposed three-tiered regulatory framework for this spectrum. The 70/80 GHz bands have been an extraordinary success story and, going forward, will likely be used even more intensively for fixed wireless backhaul. Finally, the Commission should not adopt "use or share" rules in the mmW bands, since third-party opportunistic sharing would discourage innovation and investment and could even threaten the commercial viability of these spectrum bands.

II. THE COMMISSION SHOULD PERMIT THE EXPANSION OF FIXED WIRELESS BACKHAUL OPERATIONS IN THE MMW BANDS

Like numerous commenters, Sprint applauds the Commission's efforts in this proceeding. The July 2016 *Report and Order* was a critical first step toward meeting the Commission's 5G

Service Rules for the 42-43.5 GHz Band; Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95, and 101 To Establish Uniform License Renewal, Discontinuance of Operation, and Geographic Partitioning and Spectrum Disaggregation Rules and Policies for Certain Wireless Radio Services; Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz and 48.2-50.2 GHz Frequency Bands; Allocation of Spectrum to Upgrade Fixed and Mobile Allocations in the 40.5-42.5 GHz Frequency Band; Allocation of Spectrum in the 46.9-47.0 GHz Frequency Band for Wireless Services; and Allocation of Spectrum in the 37.0- 38.0 GHz and 40.0-40.5 GHz for Government Operations, Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 8014 (2016) ("*FNPRM*" or "*Report and Order*").

mobile goals.[2] Sprint encourages the Commission to build on that order with certain actions proposed in the *FNPRM*, and it supports the Commission's proposed extension of its flexible 5G mobile rules and policies to additional mmW bands.[3] As Sprint has previously explained, however, its interest in this proceeding is not limited to the development of 5G mobile services in mmW spectrum. Sprint also believes that, in adopting 5G rules and policies, the Commission must protect existing fixed wireless services and foster the future growth of point-to-point wireless backhaul systems in these bands.

Sprint is uniquely positioned to speak to the importance of protecting wireless backhaul and other fixed point-to-point operations in the mmW bands. To support customers' growing data demands and avoid, where it can, the high cost of traditional wireline circuits, Sprint has deployed a substantial wireless backhaul network. Sprint holds approximately 19,000 fixed microwave licenses and is one of the largest users of licensed fixed microwave systems in the United States. Sprint holds a Local Multipoint Distribution Service ("LMDS") license in the 28 GHz band and currently operates over two hundred 28 GHz microwave paths as a lessee.

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[2] *Id*. *See also Use of Spectrum Bands Above 24 GHz For Mobile Radio Services; Establishing a More Flexible Framework to Facilitate Satellite Operations in the 27.5-28.35 GHz and 37.5-40 GHz Bands; Petition for Rulemaking of the Fixed Wireless Communications Coalition to Create Service Rules for the 42-43.5 GHz Band; Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95, and 101 To Establish Uniform License Renewal, Discontinuance of Operation, and Geographic Partitioning and Spectrum Disaggregation Rules and Policies for Certain Wireless Radio Services; Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz and 48.2-50.2 GHz Frequency Bands; Allocation of Spectrum to Upgrade Fixed and Mobile Allocations in the 40.5-42.5 GHz Frequency Band; Allocation of Spectrum in the 46.9-47.0 GHz Frequency Band for Wireless Services; and Allocation of Spectrum in the 37.0-38.0 GHz and 40.0-40.5 GHz for Government Operations*, Notice of Proposed Rulemaking, 30 FCC Rcd 11878 (2015) ("*2015 NPRM*").

[3] In the *FNPRM*, the Commission proposes the adoption of service rules allowing flexible fixed and mobile uses in additional mmW bands, including 24.25-24.45 GHz and 24.75-25.25 GHz, 31.8-33.4 GHz, 42-42.5 GHz, 47.2-50.2 GHz, 50.4-52.6 GHz, 71-76 GHz, and 81-86 GHz. *FNPRM* ¶ 373. As discussed below in Section III.A, Sprint opposes the Commission's proposed three-tier regulatory framework in the 71-76 GHz/81-86 GHz bands.

Sprint has also deployed over 1,200 point-to-point links in the 70/80 GHz bands. Sprint views wireless backhaul as a critical alternative in certain circumstances for delivering significant capacity with good reliability, given the high cost of traditional wireline backhaul circuits.[4]

Rather than merely protect existing fixed wireless operations, the Commission's regulatory framework in the mmW bands must enable licensees to *expand* their wireless backhaul systems in these bands. Today, the amount of spectrum available for fixed wireless backhaul is limited. Microwave point-to-point frequencies in the traditional 6 GHz, 11 GHz, 18 GHz, and 23 GHz bands have become scarce in sections of the country, especially in urban areas where those facilities are needed most. In response, Sprint and other operators have pursued wireless backhaul solutions in the mmW bands, and, without question, carriers' need for fixed wireless backhaul capacity in these bands is going to increase significantly over time. The growth in consumer demand for mobile broadband is well documented[5] and will only accelerate as 5G mobile systems are tested, deployed, and put into operation.[6] Fixed wireless backhaul will

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4 *See* Remarks of FCC Chairman Tom Wheeler at the National Press Club, *The Future of Wireless: A Vision for U.S. Leadership in a 5G World*, at 6 (June 20, 2016), http://transition.fcc.gov/Daily_Releases/Daily_Business/2016/db0620/DOC-339920A1.pdf ("[Wireline] backhaul connections can be as much as 30 percent of the cost of operating a wireless network. And with the additional sites required to support use of the millimeter wave spectrum, that percentage is likely to increase, to as much as 50 percent.").

5 *See Report and Order* ¶ 7 (discussing "the increasing demand for data from consumers using an ever wider variety of devices"); Comments of Micronet Communications, Inc. at 2 (Sept. 30, 2016) ("Micronet Comments") (discussing "the increasing data demands of almost every licensee"). Unless otherwise indicated, all comments and reply comments were filed in GN Docket No. 14-177.

6 *See Report and Order* ¶ 15 ("Momentum continues to build for developing technologies that can leverage mmW bands, including for so-called 5G services."); Comments of Collinear Networks, Inc. at 7 (filed Oct. 1, 2016; dated Sept. 30, 2016) ("Collinear Comments") ("Collinear Networks expects this trend to accelerate over the next three to five years, in part, fueled by the advent and then rollout of 5G services."); Comments of the National Spectrum Management Association at 2 (Sept. 29, 2016) ("NSMA Comments") ("Backhaul . . . will become even more critical for the microcells envisioned for the next generation 5G networks."); Comments of 5G Americas at 4 (Sept. 30, 2016) ("5G Americas Comments") ("as the industry

also become more critical as small-cell operations expand in the mmW bands and elsewhere, involving "base station" transmissions from street poles, lampposts, and other street-level and low-altitude fixtures. No carrier will be able to reach all of these points with fiber.

In order to protect existing fixed point-to-point links and permit the further expansion of fixed wireless backhaul in mmW spectrum, the Commission must adopt appropriate technical, operational, and service rules in these bands. As Sprint has previously pointed out, the Commission's interference protection rules in mmW spectrum must account for the wide variety of transmitters, devices, and use cases that are likely to be deployed in these bands.[7] It is essential that the Commission adopt interference protection provisions that are flexible enough to permit highly differing uses in the band while at the same time minimizing the potential for harmful interference between users in adjacent bands or at the edges of geographic areas.[8]

In addition, the Commission's performance requirements must account for mmW licensees that use their spectrum primarily for fixed wireless backhaul and other point-to-point operations. Fixed wireless operators must be able to retain their mmW band authorizations over the long term. On this issue, Sprint commends the Commission's decision in the *Report and Order*, which recognized that there will be multiple future uses, services, and applications in the new flexible-use mmW bands. Rather than adopt a unified, "one size fits all" performance requirement for mmW spectrum, the Commission "adopt[ed] a series of metrics, tailored for

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standardizes 5G over the next few years towards the target of 2020"). 5G systems and services are expected to be implemented on a wide-scale basis following completion of standardization activities over the next couple of years. These systems will need to have greatly expanded connectivity with fixed network infrastructure, including the Internet and network servers.

7 *See* Reply Comments of Sprint Corporation at 4 (filed Feb. 29, 2016; dated Feb. 26, 2016).

8 *See id.*

each type of service a licensee might choose to offer."[9] For fixed wireless operations in the 28 GHz, 37 GHz, and 39 GHz bands, the Commission adopted a performance requirement that is based on the number of links per population in the license area, similar to the "safe harbors" applicable to incumbent fixed wireless licensees in these bands.[10] Sprint supports this approach and urges the Commission to establish the same fixed wireless performance criteria in any additional mmW band where it adopts flexible-use, exclusive geographic area licensing.[11]

III. THE COMMISSION SHOULD NOT JEOPARDIZE FIXED WIRELESS BACKHAUL IN THE 70/80 GHz BANDS

In the *FNPRM*, the Commission proposes to introduce 5G mobile services to the 70/80 GHz bands under a licensing and regulatory framework similar to that adopted in the 3.5 GHz Citizens Broadband Radio Service ("CBRS") band. As at 3.5 GHz, this regulatory approach would rely on the use of a spectrum access system ("SAS") to facilitate spectrum sharing. Under the Commission's proposal, the SAS at 70/80 GHz (just as in the CBRS band) would administer

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9 *Report and Order* ¶ 203.

10 Specifically, the Commission requires that geographic area licensees providing Fixed Service in the 28 GHz, 37 GHz, or 39 GHz bands construct and operate at least four links in license areas with less than 268,000 population, and at least one link per 67,000 population in license areas with greater population. *Id*. ¶ 208. As the Commission noted, this standard is similar to the standard it established for fixed point-to-point services in the 2.3 GHz band. *Id.* These point-to-point links also "must be part of a network that is actually providing service, whether to unaffiliated customers or private, internal uses, and all links must be present and operational at the end of the license term." *Id.*

11 This flexible approach will help enable the Commission to meet its goal of "provid[ing] enough certainty to licensees to encourage investment and deployment in these bands as soon as possible, while retaining enough flexibility to accommodate both traditional services and new or innovate services or deployment patterns." *Report and Order* ¶ 203. In contrast, as Ericsson points out, "[o]verly prescriptive regulations could choke off experimentation, innovation, and investment, thus limiting use cases and possibilities." Comments of Ericsson at 18 (Sept. 30, 2016) ("Ericsson Comments").

three priority "tiers" in the 70/80 GHz bands: (1) incumbent access, (2) auctioned priority access, and (3) unauctioned general access.[12]

Like most commenters in this proceeding, Sprint opposes this proposal. As explained further below, the 70/80 GHz bands have been a major success story for fixed wireless backhaul and other point-to-point operations, and this three-tier framework would jeopardize fixed wireless use of this spectrum just when it is needed most. While Sprint does not oppose the eventual introduction of 5G mobile service into the 70/80 GHz bands, such operations should be permitted only: (i) after sufficient technical study and (ii) under the existing non-exclusive licensing approach used in these bands.

A. The Commission Should Not Impose Its Proposed Three-Tier Regulatory Framework on the 70/80 GHz Bands

The 70/80 GHz bands (71-76 GHz and 81-86 GHz) represent a resounding success story for fixed wireless backhaul. As numerous commenters point out, the 70/80 GHz bands are extremely attractive for wireless backhaul use, since these bands offer very wide bandwidth and enable capacities of 10 Gbps or more over distances of a few kilometers.[13] These bands are "already an important component in a variety of networks"[14] and are becoming more intensively utilized across the United States.[15] Over time, high-capacity backhaul will continue to shift from

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12 *FNPRM* ¶ 440.

13 *See* Comments of Comsearch at 3 (Sept. 30, 2016) ("Comsearch Comments"); 5G Americas Comments at 6; Ericsson Comments at 14; Comments of the Telecommunications Industry Association at 14 (Sept. 30, 2016) ("TIA Comments").

14 Comments of NEC Corporation of America at 1 (Sept. 29, 2016) ("NEC Comments").

15 *See* Comments of Anova Technologies, LLC at 3 (Sept. 30, 2016) ("Anova Comments") ("Use of the band is growing rapidly."); Collinear Comments at ii ("Use of the 70/80 GHz Bands has increased significantly in recent years."); Comments of Wi-Fi Alliance at 7 (Sept. 30, 2016) ("Wi-Fi Alliance Comments") ("[A]s the Commission recognizes, there is already extensive use of the 70/80 GHz bands.").

lower spectrum bands to the 70/80 GHz bands as LTE continues to evolve and 5G mobile services emerge around the country.

Both the *FNPRM* and commenters offer empirical evidence of fixed wireless backhaul growth at 70/80 GHz. As the Commission notes in the *FNPRM*, there are now approximately 22,600 fixed wireless links deployed at 70/80 GHz around the United States.[16] According to Anova, there were 446 active non-exclusive nationwide licenses for the 70/80 GHz band as of June 2016, an increase of over 65% in just two years, while the total number of fixed wireless links in this spectrum has increased by over 78% since 2015.[17] As indicated above, Sprint itself is making robust use of the 70/80 GHz bands, having deployed over 1,200 point-to-point links in this spectrum. Overall, more than 80% of the point-to-point links at 70/80 GHz were registered within the last five years,[18] and these bands are "expected to experience major growth and represent up to 20% of new backhaul deployments annually as soon as 2020."[19]

Given the successful, robust use of the 70/80 GHz bands since this spectrum was allocated in 2003, it is unsurprising that there is virtually no support in the record for the Commission's proposal. Like most commenters, Sprint opposes the imposition of this three-tier licensing framework at 70/80 GHz. Unlike the 3.5 GHz band, the 70/80 GHz bands are not well-suited to either this type of priority geographic licensing or the use of an SAS.

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16 *FNPRM* ¶ 425.

17 Anova Comments at 3.

18 Micronet Comments at 2.

19 Ericsson Comments at 14. Certainly, as 5G Americas observes, the 70/80 GHz bands "cannot be said to be underutilized." 5G Americas Comments at 6. *See also* Collinear Comments at 6-7 ("Use of the band continues to grow steadily. . . . Collinear Networks expects this trend to accelerate[.]"); Anova Comments at 3 ("Anova expects even more rapid growth[.]"); Micronet Comments at 2 ("We anticipate the shift to this band to continue due to the increasing data demands of almost every licensee."); NEC Comments at 1 ("[T]he 70/80 GHz band is poised for unprecedented growth.").

As numerous commenters point out, it would be premature for the Commission to rely on an SAS in the 70/80 GHz bands – or in any other mmW band for that matter – as a means for introducing mobile services. As Ericsson states, "[t]he SAS concept is new, unproven, and complex."[20] There has been no technical analysis of the suitability of the 70/80 GHz bands for sharing between fixed and mobile systems, and "there is no indication that an SAS would be an appropriate way to handle sharing, even among fixed users."[21] The Telecommunications Industry Association ("TIA") agrees that "[t]he agency should not prematurely implement a solution that lacks a problem, and certainly not before the viability of fixed-mobile co-existence has not yet been empirically established."[22] As the Fixed Wireless Communications Coalition ("FWCC") observes, even the predecessor technology to the SAS, the TV white space database, has never been tested in commercial use with mobile devices.[23] Moreover, even if SAS

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20 Ericsson Comments at 14.

21 *Id.* As Ericsson further points out, "[t]he Commission has not yet certified a single SAS operator for the 3.5 GHz band, and NTIA's Associate Administrator for Spectrum Management has cautioned about 'employing SAS . . . in other bands when we haven't even fully proven it out.'" *Id.* at 14-15.

22 TIA Comments at 15.

23 Comments of the Fixed Wireless Communications Coalition at 2-3 (Sept. 30, 2016) ("FWCC Comments"). *See also* 5G Americas Comments at 7 ("[T]he SAS is not needed in this band. The concept is new, unproven and complex."); Comments of Mobile Future at 4 (Sept. 30, 2016) ("Mobile Future Comments") ("The three-tiered sharing framework has not yet been tested, and, as government officials have pointed out, extending use of a SAS to the mmW bands would be premature."); NSMA Comments at 4 ("While the NSMA is encouraged by the concept of the SAS, it has yet to be shown to be practical for this application."); Comments of Qualcomm Incorporated at 12 (Sept. 30, 2016) ("Qualcomm Comments") ("The Commission should look to extend th[e] current framework in order to allow mobile operations in this band, rather than force fit an unnecessarily complex SAS approach into this setting."); Anova Comments at 7 ("[R]eliance on an SAS system for the 70/80 GHz band is highly premature," and "the ability of an SAS system to dynamically allocate spectrum among users is not well-suited to the 70/80 GHz band."); Comments of Siklu Inc. at 3 (Sept. 28, 2016) ("Siklu Comments") ("We do not see the need for an SAS system in the 70/80 band."). Even Open Technology Institute at New America and Public Knowledge, who were strong proponents of the CBRS rules at 3.5 GHz, oppose the application of this framework in the 70/80 GHz bands. *See* Comments of Open

technology were proven or mature, adoption of an SAS requirement and priority geographic area licensing would be a bad policy outcome for the 70/80 GHz bands. SAS implementation would create unnecessary complexity and impose administrative and operational burdens on licensees.

Significantly, the Commission's proposal is counter to its goal of encouraging efficient use of spectrum. As Anova points out, geographic licensing would reduce spectrum efficiency in these bands, because "the current rules encourage and facilitate extensive spectrum re-use among competing providers on paths that can be located in very close proximity to one another."[24] Google further points out that "the kind of area-based licensing and incumbent protection zones that are specified in the 3.5 GHz CBRS rules would impair more spectrum than necessary, significantly reducing efficiency."[25]

In Sprint's view, the increased risk and uncertainty in these bands resulting from the Commission's proposal would threaten prior investment in existing, successful fixed wireless backhaul operations and discourage further development of wireless backhaul (and other innovative services) at 70/80 GHz, just as this spectrum is needed to absorb the rapid growth in backhaul traffic. Accordingly, rather than shift to its proposed SAS-based, three-tier regulatory framework, the Commission should preserve the existing, successful non-exclusive licensing regime in this band.

Technology Institute at New America and Public Knowledge at 5, 20 (filed Oct. 1, 2016; dated Sept. 30. 2016) ("OTI and PK Comments") ("Although OTI & PK strongly supported the three-tier sharing framework the Commission adopted for the new CBRS at 3.5 GHz, we do not believe it is the best approach in these bands.").

[24] Anova Comments at 6. *See also* Siklu Comments at 3.

[25] Comments of Google Inc. and Google Fiber Inc. at 3 (filed Oct. 1, 2016; dated Sept. 30, 2016) ("Google Comments").

B. 5G Mobile Services Should Be Permitted at 70/80 GHz Only After Successful Coexistence with Fixed Operations is Demonstrated by Technical Evidence, and Only Under the Existing Non-Exclusive Licensing Rules

While Sprint opposes the Commission's proposed three-tier framework in the 70/80 GHz bands, it is nonetheless open to the eventual introduction of 5G mobile services into this spectrum. Sprint agrees with numerous commenters, however, that mobile operations in the 70/80 GHz bands should be permitted only after a determination, based on technical evidence, that these frequencies can support Non-Line-of-Sight ("NLOS") mobility communications and can successfully coexist in this spectrum with fixed wireless operations. On this issue, TIA states that "[w]hile the prospect of mobile service in the bands is enticing, at present there are no studies showing that sharing between mobile and fixed point-to-point uses are possible,"[26] while 5G Americas observes that "[m]ore study is needed to determine coexistence of mobile with fixed services in these bands, including the development of novel mitigation techniques as well as a licensing process that accommodates flexible use and the respective differences of mobile area-based operation and point-to-point operation."[27] Before allowing 5G mobile systems to operate at 70/80 GHz, the Commission must determine how 5G mobile systems and existing and

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[26] TIA Comments at 14.

[27] 5G Americas Comments at 8. *See also* Ericsson Comments at 14 ("There are no studies of the suitability of this band for sharing between mobile and fixed use[.]"); Comsearch Comments at 4 ("[we] generally suppor[t] mobile operations in the 70/80 GHz band, we suggest that more study is needed to determine the details of coexistence between mobile and fixed services"); Comments of Scientel Solutions LLC at 3 (Sept. 30, 2016) ("Scientel Comments") ("At the threshold, before the FCC makes *any* judgments about the particulars of how mobile 5G technology might be integrated into the 70/80 GHz frequency bands, Scientel believes it essential that the Commission make the following definitive engineering determination, based on consensus scientific findings.").

future fixed wireless operations can share the 70/80 GHz bands without resulting in mutual, harmful interference.[28]

Sprint also agrees with various commenters who argue that any eventual 5G mobile operations at 70/80 GHz should occur only under the existing, successful non-exclusive licensing and coordination framework in these bands, and *not* under either the Commission's three-tiered framework or the exclusive licensing approach applied in other mmW bands. Qualcomm points out that "[t]he existing regulatory framework is working very well, as the FCC itself notes, as there are no reports of interference for over 22,600 registered point-to-point links. The Commission should look to extend this current framework in order to allow mobile operations in this band."[29] Similarly, Fastback Networks states that "[w]ith respect to [the 70/80 GHz bands], the current light licensing method, with its database management, and similar models adopted around the world, has provided an effective solution that on one hand enables quick deployment, and on the other hand has been able to avoid interference between the many thousands of links installed."[30] Comsearch concurs that "the current registration and licensing framework is adequate for accommodating shared usage among fixed and mobile systems and Federal and non-Federal users with appropriate modifications."[31] In Sprint's view, the best, most viable

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[28] In its comments, Nokia "continues to urge caution as many bands being explored for mobile use are used to provide backhaul for existing and future mobile systems. As such, they are essential for the delivery of mobile broadband." Comments of Nokia at 6 (Sept. 30, 2016).

[29] Qualcomm Comments at 12.

[30] Comments of Fastback Networks at 2 (Sept. 30, 2016). TIA further points out that the existing "'green-light / yellow-light' system has been effectively used in these bands for over a decade, the necessary technical data is already available in existing databases, and an automated system for Federal coordination has been operating successfully for years. . . . TIA would support retaining the current first-in-time principle for coordination." TIA Comments at 14-15.

[31] Comsearch Comments at 6. Anova notes the "the Commission's findings in 2003 that, based on the unique characteristics of the 70/80 GHz band, 'the public interest would be served by authorizing the use of these bands through a *non-exclusive licensing scheme* combined with

approach to promoting the development of 5G mobile at 70/80 GHz will likely involve intelligent deployments and coordination under the existing non-exclusive licensing framework, potentially with some band segmentation.

C. The Commission Should Relax Its Antenna Beamwidth Requirements for Lower-Site Point-to-Point Systems

While Sprint opposes the Commission's proposed three-tier regulatory structure at 70/80 GHz, it appreciates the distinctions identified by the Commission in its proposed framework for "Class A" and "Class B" point-to-point antennas in this spectrum.[32] Sprint supports the Commission's proposed approach of requiring tighter antenna beamwidths for higher-site, higher-power fixed wireless transmitters, while allowing wider beamwidths for anticipated street-level, smaller-cell fixed deployments.

Along with Sprint, numerous commenters support the Commission's proposed differentiation between higher-site, point-to-point facilities in the 70/80 GHz bands and lower-site, "streetlamp" antennas in this spectrum. In its comments, FWCC points to "how the continuing surge in popularity of data-intensive mobile devices, particularly smartphones and tablets, has produced a need for small-cell backhaul at elevations close to street level," and says "[t]he Commission's proposed Class B licenses should go a long way toward filling this need."[33] NEC observes that "[l]ight standards, utility poles, and small monopoles do not possess the rigidity of traditional mounting structures (towers, wall mounts, and the like)" and that

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[a] site-specific coordination and registration process[.]'" Anova Comments at 6 (citing *Allocations and Service Rules for the 71-76 GHz, 81-86 GHz, and 92-95 GHz Bands; Loea Communications Corporation Petition for Rulemaking*, Report and Order, 18 FCC Rcd 23318, ¶ 45 (2003) (emphasis provided by Anova)).

32 *FNPRM* ¶ 440 (proposing to establish two classes of licenses for point-to-point operations in these bands that will be subject to certain proposed technical requirements).

33 FWCC Comments at 10.

"[r]elaxing the antenna spec to 38 dBi would provide wider beam widths of 2+ degrees, which would be more forgiving of the minor movements of these types of mounting structures."[34] 5G Americas argues that relaxed antenna rules for low-site facilities on telephone poles, light standards, and monopoles would "open[] up huge opportunities for deployment that will serve public venues with 5G backhaul services."[35]

Sprint agrees with these commenters and notes that FWCC has previously asked for relaxed antenna standards for the 70/80 GHz bands.[36] Like FWCC, Sprint believes that the Commission should relax its beamwidth requirements for low-site "Class B"-type operations in the 70/80 GHz band even further than FWCC originally requested, in order to promote the vigorous development of low-site, streetlight-level fixed operations in these bands.

D. The Commission Should Not Permit Unlicensed Services at 70/80 GHz

Sprint opposes the introduction of unlicensed services into additional mmW bands. In this proceeding, the Commission has already undertaken the repurposing of the 64-71 GHz band for unlicensed use. Given this prior action and the proximity of the 64-71 GHz band to the 70/80 GHz bands, there is no need to introduce unlicensed operations at 70/80 GHz. As a number of

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34 NEC Comments at 2.

35 5G Americas Comments at 8. *See also* Micronet Comments at 3 ("Restricting wider beamwidth antennas to a maximum AGL would support the need for small-cell backhaul at streetlamp level and would not have a negative impact on the interference environment."); Ericsson Comments at 15 ("Ericsson, however, supports allowing smaller fixed antenna (38 dBi) at low elevations above ground level (*e.g.*, 8–15 m) as an update of Part 101[.]"); Google Comments at 5 ("The Commission should adopt a gain requirement no higher than the ETSI standard, both to maximize technical flexibility for potential new uses by reducing minimum antenna size, and to improve global economies of scale for 70/80 GHz equipment.").

36 FWCC Comments at 10; *see also* Comments of the Fixed Wireless Communications Coalition, WT Docket No. 10-153 (Oct. 5, 2012); Letter from Mitchell Lazarus, Counsel, Fixed Wireless Communications Coalition, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 10-153 (Apr. 4, 2013); Letter from Mitchell Lazarus, Counsel, Fixed Wireless Communications Coalition, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 10-153 (Mar. 24, 2014).

commenters point out, existing unlicensed spectrum at 57-64 GHz in combination with the 64-71 GHz band will provide sufficient capacity and opportunity for unlicensed services and applications in the mmW bands.[37] Proponents of unlicensed spectrum should focus on developing innovative uses of the 57-71 GHz band segment rather than extending unlicensed operations to a nearby band that is thriving under a successful non-exclusive licensing and registration framework.[38] Finally, rather than fall into some new unlicensed service category, any indoor deployments in the 70/80 GHz bands should simply comply with the existing non-exclusive licensing and coordination framework in these bands.[39]

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[37] *See* 5G Americas Comments at 7 ("We do not believe unlicensed use of the 70/80 GHz band is warranted. . . . Considering that unlicensed use now has access to 14 GHz of spectrum in the expanded 60 GHz band, we do not see a compelling need to subject the 70/80 GHz band to this type of mixed use[.]"); Qualcomm Comments at 12 ("The availability of 14 GHz of unlicensed spectrum in the 60 GHz band should be sufficient for indoor operations at the present time."); Ericsson Comments at 15 ("Ericsson opposes the provisioning of unlicensed use in the 70/80 GHz band, even indoors. . . . The availability of 14 GHz of unlicensed spectrum in the 60 GHz band is quite sufficient for the foreseeable future[.]"); TIA Comments at 15 ("[T]he Commission should not permit unlicensed indoor-only use in these bands. . . . At least for now, the availability of 14 GHz of contiguous unlicensed millimeter-wave spectrum between 57-71 GHz is quite sufficient."); Comments of Huawei Technologies, Inc. (USA) and Huawei Technologies Co., Ltd. at 10 (Sept. 30, 2016) ("[U]nlicensed (for indoor) use of this band is unnecessary in light of the additional 7 GHz of unlicensed spectrum designated for the 64-71 GHz band in the R&O together with the 92-95 GHz band."). Certain commenters also note that there has been only relatively sparse use of the 57-64 GHz unlicensed band since the Commission's designation of that ISM band. *See* 5G Americas Comments at 7; Ericsson Comments at 15.

[38] *See* OTI and PK Comments at 19-20; Comments of NCTA – The Internet & Television Association at 7-8 (Sept. 30, 2016); Comments of Microsoft Corporation at 8-9 (Sept. 30, 2016).

[39] *See* Ericsson Comments at 15 ("If indoor licensed use is allowed it must be registered to not only protect federal users, but also to protect outdoor backhaul use."); TIA Comments at 15 ("[I]f any indoor licensed use is eventually allowed, it should be registered in some manner to not only protect Federal users, but also to protect outdoor backhaul use.").

IV. THE COMMISSION SHOULD NOT IMPLEMENT "USE OR SHARE" POLICIES IN THE MMW BANDS

Like most who commented on the *FNPRM* (and the 2015 *NPRM*), Sprint opposes the "use or share" rules in mmW bands where operators have or will have exclusive use licenses.[40] If the Commission permits third parties to operate opportunistically in licensees' authorized mmW band spectrum, it will discourage innovation and investment, endangering the commercial viability of 5G mobile, fixed wireless backhaul, and other services in these bands.

If the Commission imposes a "use or share" framework in exclusively licensed mmW bands, it will complicate licensees' network planning and use of their spectrum and result in substantial costs, delays, and administrative burdens for these operators. Licensees would be forced to track parties' secondary spectrum usage, detect and eliminate harmful interference, and resolve disputes over opportunistic users' obligation to vacate the spectrum.[41] As 5G Americas indicates, "[s]ome of these factors will have impact prior to the initial deployment of the spectrum, and others will impact the operations on an ongoing basis."[42] Given the need for these various activities, carriers would be unable to fluidly and flexibly expand their network capacity and coverage in response to market demand.[43] Such operational constraints would be particularly difficult for smaller, resource-limited carriers.

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40 *See* 5G Americas Comments at 16 ("A UoS mandate was roundly rejected by a majority of commenters in the *Notice of Proposed Rulemaking*.").

41 On the issue of a secondary operator's need to discontinue operations, TIA observes that "the Commission does no one any favors when it encourages the deployment of new services on a secondary basis that are likely to be short-lived. At best, consumers become frustrated when they lose their secondary service, and at worst the Commission and parties become embroiled in disputes over the secondary provider's obligation to vacate the spectrum." TIA Comments at 19.

42 5G Americas Comments at 22.

43 *See* Ericsson Comments at 19 ("Networks grow in capacity and coverage over time in response to demand and other factors, including development of a vibrant ecosystem of devices,

Overall, the added risk and uncertainty resulting from "use or share" would undercut development and deployment in the mmW bands, destabilizing operators' build-out efforts and devaluing this spectrum. As Mobile Future describes, "[a]dopting a use-or-share requirement would needlessly limit licensees' flexibility to examine different uses and technologies, and could imperil development of innovative 5G technologies in the bands."[44] In the face of such public interest harm, Nextlink points out that the primary beneficiaries of a "use of share" policy would likely be "spectrum 'trolls' who benefit from licensees' efforts and investments without contributing to the full 5G deployment effort or the initial acquisition of the spectrum itself."[45]

Rather than apply "use or share" rules to exclusively licensed mmW bands, the Commission should promote access to spectrum in these bands through its proven secondary market mechanisms and conventional licensing and regulatory procedures. As in other spectrum bands, third parties will be able to gain access to licensed mmW spectrum through the Commission's secondary market processes, such as license assignment, partitioning and disaggregation, and spectrum leasing. As Ericsson points out in opposing "use or share," "secondary markets allow carriers to transfer spectrum and put it to its highest and best use."[46] Without evidence of current or future market failure in the mmW bands, the Commission should avoid a burdensome and counterproductive sharing regime in this spectrum.

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applications, services, and providers. By its nature a shared access regime would hinder the licensee's ability to expand network reach as it sees fit.")

44 Mobile Future Comments at 6. *See also* Comments of Intel Corporation at 20 (Sept. 30, 2016) ("Just the initial delays from developing rules to quantify, measure, report, and enforce the definition of 'unused' spectrum could set back the market introduction of this spectrum."); TIA Comments at 20 ("[D]elays in implementing band-specific rules for such sharing could lengthen product development cycles as sharing requirements are ascertained and implemented.").

45 Comments of Nextlink Wireless, LLC at 27 (filed Oct. 1, 2016; dated Sept. 30, 2016).

46 Ericsson Comments at 19.

V. CONCLUSION

As described in these Reply Comments, the Commission must protect, and permit the further expansion of, fixed wireless backhaul operations in the mmW bands. The Commission should preserve the existing, non-exclusive licensing rules in the 70/80 GHz bands rather than adopt its proposed three-tiered regulatory framework, and should not adopt "use or share" rules or otherwise permit third-party opportunistic sharing of exclusively licensed mmW spectrum.

Respectfully submitted,

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